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1. Title of the Invention:

Air sterilization and purification apparatus

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5. List of Appended Documents

(1) Specification (2) Drawings

1 set 1 set

(3) Duplicate Copy of Application

1 set

(4) Power of Attorney

1 set Method Examination

(5) Request for Examination

1 set

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Specification

1. Name of the Invention: Air Sterilization and Purification Apparatus

2. Scope of Patent Claims

In an air purification apparatus that passes positively charged airborne dust between opposing electrodes, an air sterilization and purification apparatus wherein air is caused to pass through while inducing a separation phenomenon by switching the direction of flow of air that passes through the aforementioned opposing electrodes and modifying a cross section of the passage.

3. Detailed Description of the Invention

The invention of the present application is one that relates to an air sterilization and purification apparatus, and in a purification device that causes airborne dust particles to be absorbed by static electricity, relates to a device capable of raising dust removal effectiveness, and is intended to achieve an air sterilization and purification apparatus that, in particular, is made up of a combination of novel and ever simpler elements, is manufactured by a simple process with lower costs of production, and that, with excellent safety, is capable of achieving even better results in use.

Along with the development of heavy industry, air pollution from sources at each stage of the production process, nitrous oxide and sulfur dioxide emitted from transportation sources, and heavy metal particulates, have steadily increased. The widespread expansion of pollution has become an issue of serious concern to society, and various regulations have been proposed to prevent pollution, including preventing the generation of toxic materials as well as the strengthening of emissions standards. These approaches, however, cannot be considered adequate, and there are a growing number of people who suffer from lung cancer and other cancers as well as an increase in the number of people suffering from asthma. Air purifiers have become a common and indispensable part of life and are to be found installed in homes and sickrooms to prevent and/or treat these illnesses, and are used as prevention or treatment devices in the production stages of sanitary pharmaceuticals, foods, devices, and are also employed in the production of precision machinery.

A variety of devices have been suggested to cleanse the air by removing airborne toxic materials. Among those are air purifiers that use filter materials in air flow passageways to physically collect the dust, or electrical air purification devices such as dust removers that make use of static electricity or infrared rays to disinfect the air, or a combination of any of these approaches in order to remove toxic materials.

Among these, suggestions for conventional devices based on the aforementioned use of static electricity are known, including, for example, (a) an approach utilizing centrifugal force designed such that air, induced from an air inlet, passes through an ionization element while electrical voltage is applied to the inner and outer cylinders while the inner cylinder rotates, moving the air between the inner and outer cylinders, and (b) an approach where, in the above configuration, the outer circumference of an inner cylinder has inclined guide vanes provided in the axial direction along the outer circumference of the inner cylinder and rotational movement is applied to the air as it passes through between the inner and outer cylinders to make use of centrifugal force.

The above mentioned approaches have attempted combined dust collection by the use of electrostatic migration and centrifugal force, however, because high voltages with 11 KV in between the inner and outer cylinders, and as a result of rotating the induced air, a rectified electricity may be generated due to frictional resistance depending upon the air flow rate, and electric discharge sparks may occur between the dust particles that have collected onto the external cylinder, frequently causing risk of electrocution as well as the increased production of ozone and possible malfunction of the device.

In view of the above, research conducted by the inventors of the present application have overcome and eliminated the well known defects described above, and have perfected a device that is superior in terms of safety and that markedly increases the efficiency with which dust is adsorbed. The invention comprises a fan motor; an inner cylindrical electrode that has a

built-in high-voltage transformer, and that is connected to the positive side; a high voltage cap connected to the negative side; an external cylindrical electrode that is earthed; and a housing that has openings on both sides, and that is supported by a pedestal. On occasion that airborne dust that is guided into the unit through the upper inlet passes through an ionization section high-voltage cap that is connected on the negative side, a positive charge is applied to the dust, and it is guided into the electrostatic field between the grounded outer cylindrical electrode and the positive inner cylindrical electrode, and as a result of the electrostatic induction effect, airborne dust passing through is adsorbed onto the surface of the outer cylindrical electrode. Thus, the present invention is characterized by having opposing electrodes that have a plurality of parallel curved surfaces and a plurality of convex curved surfaces or recessed curved surfaces on the inner cylinder and an outer cylinder provided with a plurality of parallel curved surfaces and a plurality of convex curved surfaces or recessed surfaces, wherein the convex curved surfaces or recessed surfaces of the inner cylinder and the convex surfaces or recessed surfaces of the outer cylinder alternate with each other. By creating an electrostatic field between these opposing cylinders, the direction of the flow of air passing through them can be alternated, and the flow passageway cross section can be altered so that the flow rate fluctuates, thereby creating a flow separation phenomenon. This causes the generation of a stagnant flow, a reverse flow, or a turbulent flow of air that contains dust. The intention here is to extend the duration of the effect of the electrostatic adsorption on the outer cylindrical electrode surface and to increase in the efficiency of dust removal. The next object of this invention is to provide a device with superior safety. Additionally, an object of the invention is to provide a simple and compact mechanism that can be made available at low cost and that can be placed easily in a variety of locations, as well as to provide a device that allows simple, easy, and safe cleaning of the panel upon which the dust has been adsorbed. Other objects and characteristics of the present invention can be understood. from the following explanation.

In Figs. 1 through 5, a housing acceptor cylinder (5) is supported on a stand (1) by means of a shaft (2) upon which a support board (4) consisting of insulating material and provided with exhaust windows (3); an external cylinder accepting cylinder (7) is mounted on the edge of the lower opening section of said housing; an exhaust windows (6') is arranged in the external cylinder barrel (7); and a fan motor (8) is internally installed in a motor cap (9). The fan motor (8) (for practical purposes, preferably with a maximum torque of 1040 ± 10%) is connected to a power source, and the motor cap (9) has a built-in high-voltage transformer (11) that is connected to a power source. An inner tube electrode (14) made of metal and provided with stepwise alternating vertical curved surfaces (12) and convex curved surfaces (13) is installed onto the positive side of the high-voltage transformer, and a rounded-head inner cap (16) made of insulating material and continuing the multiple outer cylinder support [illegible] (15), (15) is mounted in the top opening of this inner cylindrical electrode (14). A metallic high voltage cap (18) that is provided with a limit switch (17) is installed in this cap (16) and connected to the negative side of the high-voltage transformer and a metallic outer cylindrical electrode (22) provided with stepwise alternating vertical curved surfaces (20) and recessed curved surfaces (21) on the upper opening edge step section (19) of the outer cylinder acceptor (7). The vertical arced surfaces (20) and the recessed arced surfaces (21) are positioned so as to face the swelling arced surfaces (12) on the inner cylindrical electrode (14) and the vertical arced surfaces (12) on the inner cylindrical electrode (14) with each other, respectively. The external cylindrical electrode (22) faces the inner cylindrical electrode (14). According to FIG. 1, an air inlet window (23) is arranged in the upper opening of the external cylindrical electrode (22), and a retainer plate (25) made of insulating material is provided on the bottom limit switch retainer element (24). Next,

the housing (27) is installed on the upper opening of the outer perimeter section (26) of the housing acceptor cylinder (5), which is installed on the support board (4). A head section retaining cylinder (28) is installed at the top section of this opening, and an air inlet window (29) is provided in this upper opening and a connector board (31) made of insulating material and provided with dust-proof mesh/screen (30) that is connected by means of bolts (32) to the retainer plate (25), air inlet windows (29), and air inlet windows (23), and is configured so that air passes between the inner and outer electrodes, the exhaust windows (6), and the exhaust windows (3), and is circulated to the outside when the fan motor (8) is operating.

At this time, when the high voltage transformer (11) and power source are connected by a switch, which is separately arranged (in practical terms, an input voltage of 100 V AC and output voltage of 7 KV DC are preferable) the airborne dust that is introduced [into the unit] is positively charged in the vicinity of the transformer (11), by the inner cylindrical electrode (14) that has been connected to the positive side by means of the electrostatic induction between the inner and outer electrodes, and is migrated to the external cylindrical electrodes (22) and clung to its walls.

Here, the direction of the air flow that is passing through the convex curved surfaces (12) and vertical curved surfaces (13) provided on the inner cylindrical electrode (14) is switched by the vertical curved surfaces (20) and recessed curved surfaces (21) provided on the outer cylindrical electrodes (22), and as a result of the change in the cross section layer between these electrodes, the spacing between the vertical curved surfaces (12), (20) of both electrodes should be approximately 20 mm; the spacing between the vertical curved surfaces (21) on the outer cylindrical electrodes (22) and the convex surfaces (13) on the inner cylindrical electrodes (14) should be approximately 16 mm; and the spacing between the recessed curved surfaces (21) on the outer cylindrical electrodes (22) and the vertical curved surfaces (12) on the inner cylindrical electrode (14) should be approximately 25 mm, for practical purposes. The recessed curved surfaces (21) should be 5 mm in diameter, while the convex curved surfaces (13) should be 4 mm in diameter. There is a change in flow rate, and the separation phenomenon is augmented. As a result, the dust-bearing air flow stagnates, reverses or becomes turbulent, thereby extending the duration for electrostatic adsorption and increasing dust collection efficiency (Fig. 6).

In the cross sectional configuration of the above mentioned both electrodes described above, in another embodiment, the convex curved surfaces (13) of the inner cylindrical electrodes (14) could have a gentle linear flow [illegible] convex curved surfaces (13) on the upstream side to intensify the switching of the direction of flow and the change in the flow passageway cross section, making it that much easier for the separation phenomenon to occur, forming lead (33) between the convex curved surfaces (13), (13) for a configuration that augments electrostatic induction. (Fig. 7)

Moreover, as a separate embodiment, convex curved surfaces (34) with gentle flow lines are formed on the upstream side of the outer cylindrical electrodes (22), and both flow line convex curved surfaces (34) and flow line convex curved surfaces (35) are positioned so they oppose one another, thereby intensifying the switching of the direction of flow and the change in the flow passageway cross section, extending the duration in which adsorption occurs due to stagnation, reverse flow, and turbulent flow of the dust-containing air (Fig. 8).

With regard to removal of dust clung onto the surfaces of the outer cylindrical electrodes, the power to electrode (22) is removed along with the retainer plate (25) by removing the connector board (31) and by pulling up and removing the head section retaining cylinder (28) and the housing (27), and after cleaning these, it is easy to restore them to their original state and join together. At this time, the retainer element (24) of the retainer plate (25) is separated from the limit switch

(17), thereby breaking off the flow of current between the high-voltage transformer (11) and the power source, so that there is no risk of electrocution.

As configured above, the present invention extends the duration of the cling effect on the outer cylindrical electrode by means of electrostatic induction of the dust-carrying air that passes between the electrodes, thereby increasing the efficiency of dust removal and reducing mold spores and yeast fungus. Moreover, this is a particularly safe device since there is no danger that frictional force and resulting

Moreover, this is a particularly safe device since there is no danger that frictional force and resulting rectified electricity will be generated as a result of centrifugal force as the air passes through the unit, and the risk of malfunction due to sparking electric discharge between the adsorbed dust particles resulting in electrocution or explosion can be prevented, and the generation of ozone can be suppressed.

Also, given the device's simple and compact configuration, it can be manufactured less expensively, and it is also easy to move.

4. Brief Description of the Drawings

Figure 1 is a front view. Figure 2 is a plan view. Figure 3 is a view of the bottom surface. Figure 4 is a cross-sectional view along the A-A line in Figure 1. Figure 5 is a cross-sectional view along the B-B line in Figure 1. Figure 6 is an enlarged view of the area indicated by the letter E in Figure 4. Figure 7 is an enlarged flow line cross section diagram of another embodiment. Figure 8 is an enlarged flow line cross section diagram of yet another embodiment.

Applicant: Kyowa Seiko, Ltd. Agent: Hiraki MIURA [seal]



医罗克克异类血管

S. KHAMODA

DOM:

负任批



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日降日本の戦日

あのせ存を以えられた丹々のの人心にんを、 3 1 子马式碱的无弧线电动马上分配した空纵性骨头 景化のいて、土尼ガリナる電流関を造進する原体 心具朴为风景极为古世。水口就称中极而增生现代 させらしとによつて、 気性系数で対でせながら空 モガガモしめるようにしたととももなどする文

本篇の模別 仗。空女就就被命兵或长以 仁、史贞 ふんじんそが世界により気がせしめる世界の やいて、その物質質単を扱けるととのできる 松枝を押し、とく水気はて一度単純を発生の飲み 本乡。 阿华在江北世上乡位50位安代中城市庄· 要我。水口兴达技术优九、上多点似使用兴兴之 得るどとのできる記録試算はひ録式を补んとする 405886

我可有工程心理或代码的。专物效照代表化点的

(9) 日本国共計庁

公開特許公報

(1)4761148 51-9007%

60公開日 昭51 (1976) 8 6

四排脱昭 10-16080

❷出顧日 昭№. (1975).2.6 審查請求

厅内整理番号 7133 41

00日本分類 72 CFY

MALCI? BOSC S/4P

とないえず、大気行気による質点とその他のオ 对灰板灰毛皮与软材皮的皮包包、干肉、肉或黄色 もして北い放火箱点上卒品、大品、ゼ共省の生々 衣服化かいてさらに又。 年間後はの対放政機だる いてサ及し、失奇上不写久の事或とそつ元。

そとで、主気中の省合的気を取欠して対を作の たが白羽食が祖々茂螭され、七つちくつ水は皇太 の福祉体化かいて何之位。 建海绵可亚用い物用的 成才名人のかとび於電気物物により気滞休息 さしかるもの文は水丸が七男い東京が長を開する 华仪权的代价中化十二的股モの份上记书故僧の点

かせ辞合によつて百古物質を除去せんとする技术 ボモゼれている。

変心、自己体を位置用におく選集の研究は、対 えば、切、空球人口から不入でれた空球が写解が を扱って、将某時に変更を印かるれた会点の可が 質問を、門供の関うを実践しながら通過するよう にした故心方を利用する投票、何。上記の対しなれ かいて、門似の外が似にかって特方のに別しの対象 した現の方を相よ、空域からの行が同様の可能 特を強風する時に既伝達を与えられるようにし 未常の方を得合する製業の水均られている。

上四の気軽は、質量気の吸引力と残心力との企業製造作品を出つたるのであるが、強力的共同的例に11xxの方質型のを印刷し、成人四位を定理のではない。以及四位を定理のではない。以及の対象によっては水準があり、大力との形式があり、大力との形式があり、大力との形式があり、大力との形式を見られるがあり、大力との形式を見られるが、大力となったのでの対象をあれるようたのでの対象となったのでの対象となった。

。 及れる行われたコミエラ明の利用を存しく出現・ ナス。

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₩D FB51-98077 (2)

上包长女子。并为女子关乎以外又口尸是上纪众 知の異年による女友を意味を示し、さらに会心水 **だ低れ、ふんじんら貝お前不せ一切可わるととの** でもる典性をお出したもので、ファンモートル、 高肥トランスを対象しその何に対似した円井 4点 ・女の女に点非した双星キャップで選ぶしたお白 《在如上切荷州长州口部七多万分K.天之名北北八 タリングから書戻され、上万入日本も丹入される 在城市中土人也无世。 双口间的口齿电机 化阿亚丁 イツアの食品がを混乱する際、果のも質を与えら 几、蔡承式九九月前軍軍上巡の他に制設された門 超过报酬的群准保存办书。 长年前张 ておおすりを以中の本心でんだればなど間に氏力 せしめる最低を促するもので、 しゃべつておりの の母の代上)、双門ナふせ何は、教皇の平行兵官 と収益の毎点低留大伙司権基礎を共える背荷と、 D·文·萨·汉·福·日平行张州 L·农·州 在 网络 网络 《 民 民 后 出 就用他几年外间之后,七〇行他〇家回到而又收回 油製罐之、外份の四曲製鋼具は白田製鋼を全架室。

グソク穴河内の下方端口質点表に、対気を(o') と 在竹木是母母田老田老儿大师有关并囚死我也。七 の上方年にファンモートル似を内容した島は大針。 からでななートルをポタフ付を欠けし、アナンセ ニトト何(気用的に飲食大きかき上りょう大まり メポススしい」を電点には味するととかまび、な 《一人火々七ツツ创业及复数州区建筑区标题 仁か 実施チラドス (13) 七月以し、別が仁宗を代の (28) と早出代記(178)と、七段付給代死江に渡けた心民。0 可憐せ板 (34) 七月起トランネの玉の点形の泉して · 通行的 电线 (D4) 电上对原口环境。 计测量 とし収収の外質文之異 (201. (25) そ長収し大成役.米 株大らなる内質やイップ (MLを双矢して、放子) ァス(ion K りくととのしゃす (in)を行列した金利 ロ其氏やイツブ (地)を歩ぎし、 写をトランスの名 **の食に口味ナスヒとかるが、胃熱化性の質ののよ** 双非口口电表医(20) 长。水河明显的是其美国 (80)。 大四角被關 (EE) と主教物的民父夏代教が大会長の。 永賀元氏(四) 中午をして、 その日日大学 (心) 大江 算成長(24)の製品質量(12)とかて仮字の目前収益

(EI) 化内容电弧 (EL) 中央电弧 (E) 上五下代数片 するようになだかりして、おお鬼気 (14) と羽貫さ せて見ぶし大上、その上が、何口をに乗ぶえ かけ を 具え、下側にましフトスインナロ界えおけ (A) モ 打电子品格量中平多年品刊(2) 电影景人。 表 化 時 記 安 是 現 仰 火 年 身 し た ハ ゥ ラ ソ タ 負 両 倒 の 上ガロロボル奥石県 (四) にハナチング (四) て気の し、その上アは日哲院団は神え日(四)を任何した 上。その上写命URIC M. G. G. G. G. D. L. サテェの別 周朝(2015年日代した20代末付中りまる延知度(33) 東野毎し、ボールト (DE) を含して対人歌(el) と深 ・「好し、母母ならななしめ、ファンユートルのもか」 寺の歌。父女は近你な(四)かとび弁上京(四)の史 以取 (A) D I C H (25) L B 。 P 。 外间形面积长流 流 し、井久県 (ef. 内のを何でればに前似ナる名 以とする.

その頃、名近トランス (33) 「非月的には、入力 電面入・0、100マ、組力電電ン・0、マボマ 、平満又ひい。」とは無とを胴に皮切たスイッテ により出記すれば、岸入方れる弦ス字のよんじん

上尼天年也の明西於代ですって、何の実施可として、行為证明 (14) の出的共高 (15) の上处司を投 か改成证明出版而 (13/1)としまれ、不同の公治を上が、 程度明显明の代化を決定し、対抗収益を一層部局 化するとともK可与K、放棄的基础間 (13)、[23] K 活動 (23) を経済して貧速需要を結長する標度とす ぶとともできる。(657 形)

可多状文。 製の表達的として、 於然或数 (24) 化 ~ 上記例にかいて成かる思切的異数器 (24) を致け、 打四項目に下於四にかいて最少な変型が高異菌 (25) を散け、 再表表の出其言 (24) (25) を変す、 再表表の出其言 (25) を変す、 再表表の出其言 (25) を変す、 のの と と う 也 化 ません な で し こ を で と う 也 化 ままま な で な か し て か の と と う 也 化 ま せ へ な 重 型 気 の 存 は 。 逆 便、 切 の を に と え を 有 水 の 向 を と う 付 メ ナ エ と し で き る。 (ボ e 智)

東に、外有名種首に表面でれた本がじんの数要に自つては、対面品の数 [62] を成り取し、対面の 上面 (20]かよびハラグング [27]を引上げて成り取 した上い得点で [26] とどくに人間を配 (20) 生別を 女を特別したは、成状になしておけてなった。 (四) 代數別或化字の解析性的成分。 · 公司代表の公子的在無数 (24) 代页和分子的基础 · 我可以,可以其可以數式中心不可以是如此式 · 我可以,可以其可以 · 我可以 · 我可以

との前、丹賀電塔 (Ju) K駅サ大乗88 電影 (20) b 医医乳蛋白肝 心水。外有效风息时长量分元的反果 M (m)と日井眞貞 (21)とによって、豆女のお送ナ 成の母母母(河田台代政河北県の森民東 1324。 (20) 口网络红钢 8 0 次、北京电报 (以) 0 最长其岩 (22) 上月前常販(江山)の電影製製 (江川上の河風社市 1.4%。从其《昼 (80) 夕日的美景 (31) 七四萬宝岩 C34) の是似英雄 (33) との内値をおまる先とすると と、日子の日本祭育 (E) 化 5 汽气、G 田英南 (15) はくろうとすることがはてしい。10年代によづ て促済水気無し、なれの対な表末を収入するのが と立き、とれだよのて立成決然の最充の存存、気 化汉以北京设度市场组立电外的发展区域的设置设施 作用时间的复数形型 5 北京城市发生地域 しゅる 将京とナス。(34 4 18)

わりて青年が見てるる。との成神大変 (20) の神大 集計 (21) 水ヤミットスイッチ (21) とな越し、写匠 トフンパ 111) と変似とのなれてあつので、成常の ママれを出じない。

本家の既明化、上記の収求だとるので、労政成 何を基準する古成記及水管電影型によって外貨電 電団に取労作等時間を展長するので、その取風が 本を集が大つその資本が四、終在森林の数十を何 するにとができる。

文、金道中の交往社、強心力率化大つて無お民 技能とる可能を知り発生のかそれなるく。よつて 来渡されたふんじんとの間に火花支管に成例する 成世紀いて仕様を毎の間をを示点に対点すること までも、又オンンの何出を放射することをできる 供会体に使れた例像である。

さら氏機器が簡単小形でも30で歯承を工成と より式い生取分を以て出版されかつ平面ならてお る。

4、韓国の資産を試明

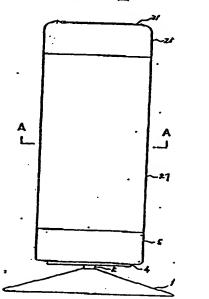
系工四柱巨板间、第二组纹平面团。 3.3 电纹灰

知物、可も同はヨュガムー人は大かける成所制図。スプロな月3~3時代かける成前間別、ギロ形は古 (で) ける 成大可以及公司。 エリ男女の(を) 発音例にかける月本大明可能説図、おり回せる少な。
ための天命のにかける男女大所買電説のである。

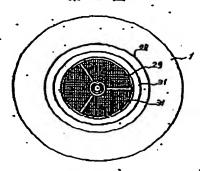
工 林 映 都 44条件 人租赁

靈

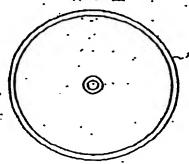
46円 昭51—90077 (4). 到 | 図



第 2 図

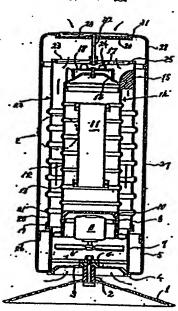


第3回



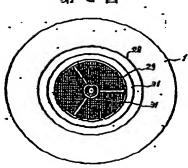
-400

第 4 5 7

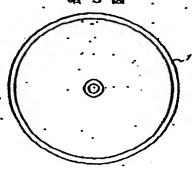


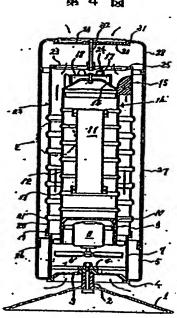
特用 图SI-\$0077 (4). 湖 | 図

第 2 図



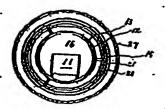
報 3 図

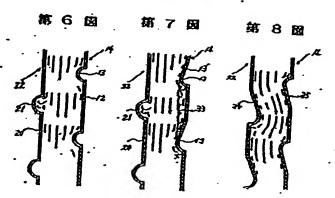




松阳 昭51—90077 (5)

苯 5 図





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